(12) UK Patent Application (19) GB (11) 2 102 364 A

(21) Application No 8221021
(22) Date of filing 19 Jul 1982
(30) Priority data
(31) 3128276
(32) 17 Jul 1981
(33) Fed. Rep. of Germany (DE)
(43) Application published
2 Feb 1983
(51) INT CL³
B60R 1/06
(52) Domestic classification
B7J 69
(56) Documents cited
None
(58) Field of search
B7J

(71) Applicants
Hohe KG
(FR Germany),
6981 Collenberg, Federal
Republic of Germany
(72) Inventor
Rudolf Kaspar
(74) Agents
Marks and Clerk,
57—60 Lincoln's Inn
Fields, London WC2A 3LS

(54) Motor-operable vehicle rear view mirrors

(57) A motor-operated vehicle rear view mirror comprises a mirror carrier 7 pivotably mounted about two axes. The carrier is connected to motors 40.1, 40.2 controlled by circuits 70.1, 70.2 for orienting the mirror. A memory, e.g. using potentiometers 10.1, 10.2, 12.1, 12.2, is provided for selectively automatically setting the mirror to preset desired orientations to suit different drivers.

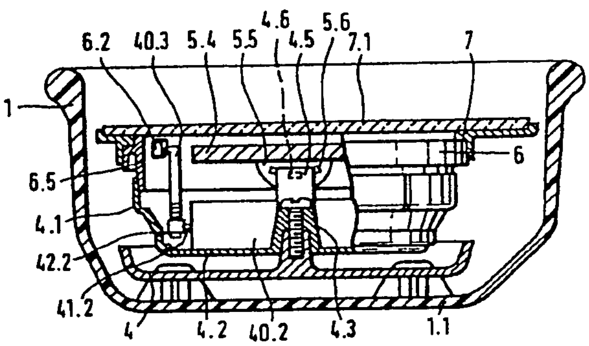

FIG.2

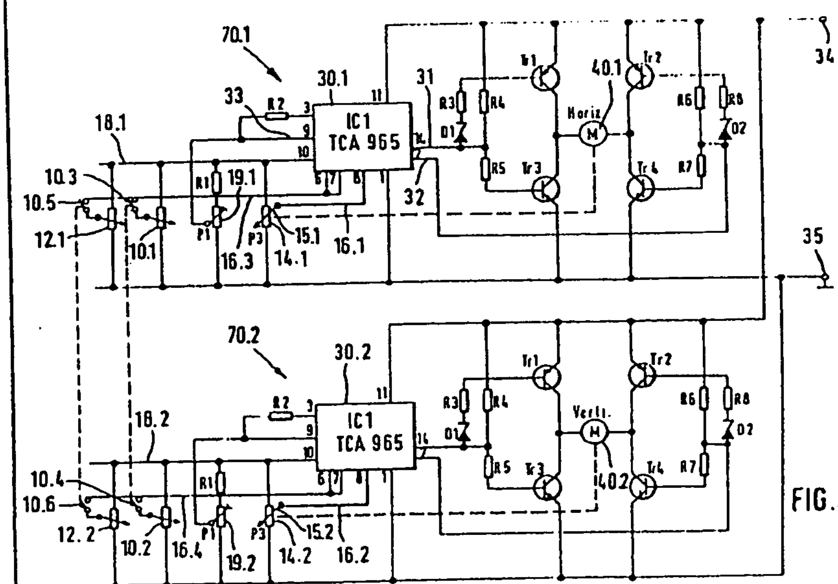

FIG.3

GB 2 102 364 A

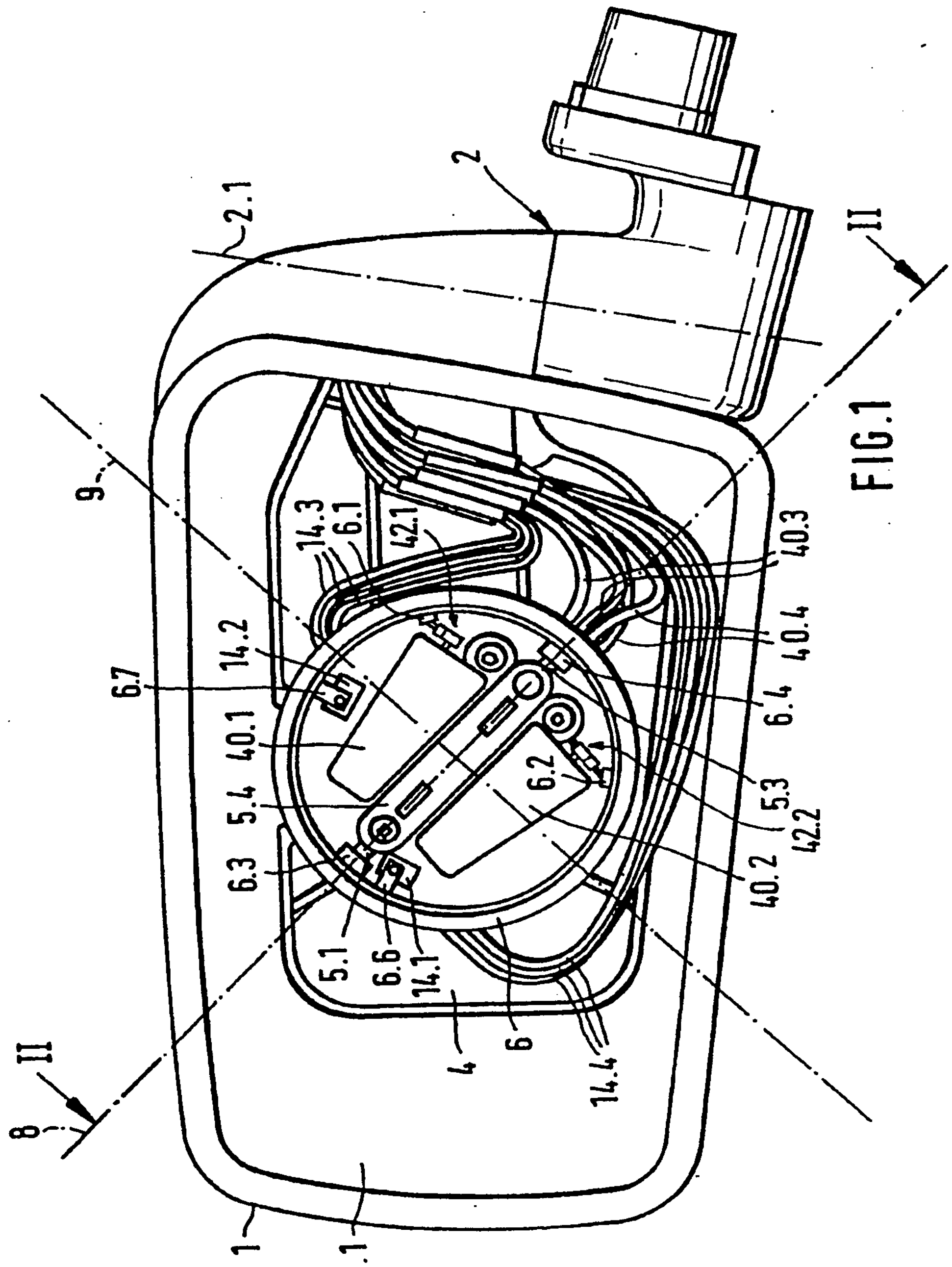
2
2.1
II
9
14.3
6.1
42.1
40.3
40.4
6.4
5.3
42.2
6.2
40.2
14.2
6.7
40.1
5.4
6.3
5.1
6.6
14.1
4
6
14.4
II
8
1
1.1

FIG.1

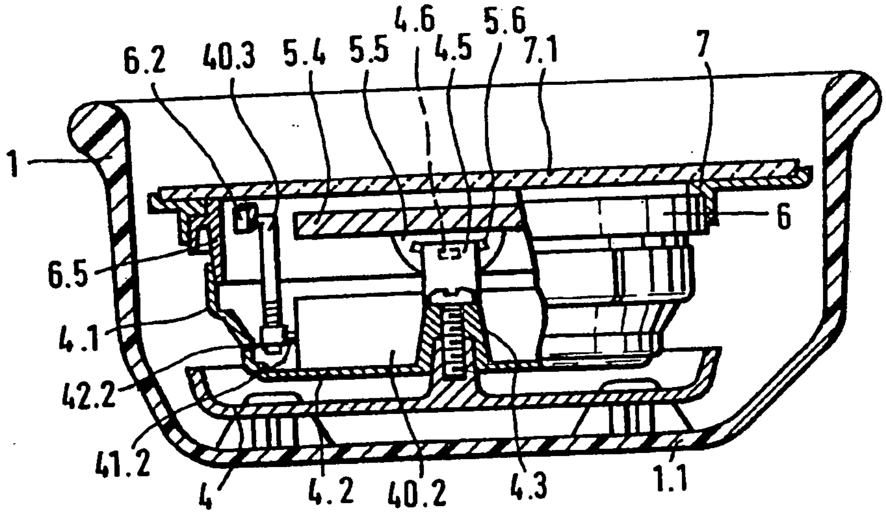

FIG.2

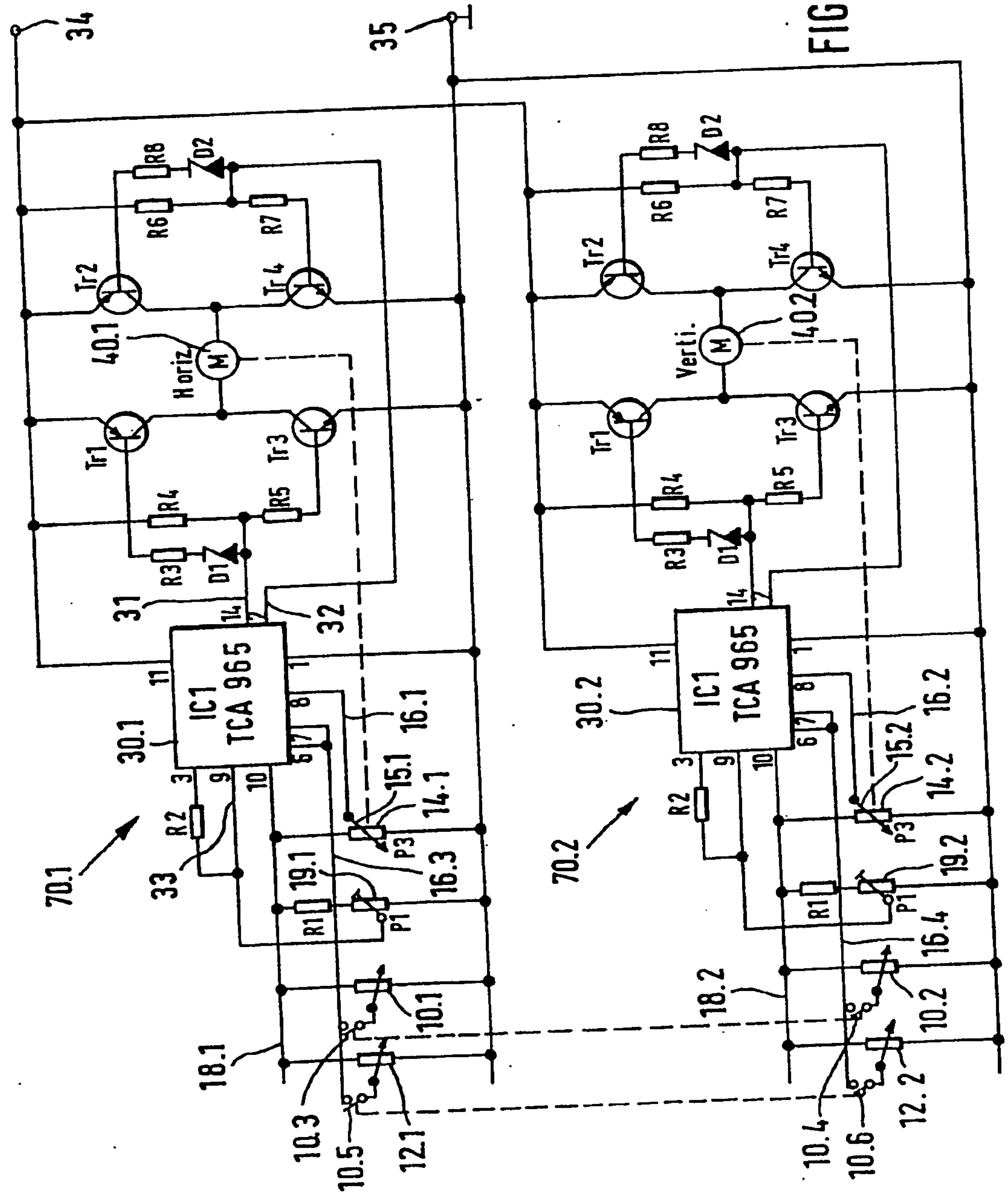
34
35
70.1
70.2
30.1
30.2
IC1
TCA 965
Horiz
Verti.
M
40.1
40.2
Tr1
Tr2
Tr3
Tr4
R1
R2
R3
R4
R5
R6
R7
R8
D1
D2
P1
P3
31
32
33
14.1
14.2
15.1
15.2
16.1
16.2
16.3
16.4
18.1
18.2
19.1
19.2
10.1
10.2
10.3
10.4
10.5
10.6
12.1
12.2

FIG.3

SPECIFICATION

Improvements in or relating to motor operable rear view mirrors for motor vehicles

The invention relates to a rear view mirror for motor vehicles, for instance of the type in which a mirror glass carrier is fastened on a mounting plate and is pivotable about two independent axes with respect to the mounting plate. The mirror glass carrier is coupled to drive shafts of electrically driven positioning motors at two pivot points angularly displaced with respect to the intersection of the axes. In the power supply circuit of each of the two positioning motors, a circuit is arranged for the selective operation of the associated positioning motor.

The rear view mirror known from DE-AS 1,266,159 and DE-AS 2,822,681 permits setting, by means of a motor, to the position necessary for the sitting position of the driver through actuation of a control accessible to the operator of the vehicle. As the mirror is adjusted with the mirror glass carrier during a stationary period of the vehicle or for another driver of the same vehicle, the rear view mirror must be repeatedly replaced in the original position through corresponding operation of the circuit. This periodic readjustment of the rear view mirror is however time consuming and inconvenient.

According to the invention, there is provided a rear view mirror for a vehicle, comprising a mirror glass carrier fastened on a mounting plate and pivotable with respect to the mounting plate about two independent axes, the carrier being coupled to drive shafts of electrically driven positioning motors at two pivot points angularly displaced with respect to each other about the intersection of the axes, there being provided a power supply circuit for each of the two positioning motors including a circuit for the desired operation of the associated positioning motor, the desired operation circuit including a memory for recallably storing at least one adjustable desired position of the mirror glass carrier with respect to the two axes.

Thus the driver is largely freed from the periodic readjustment of the rear view mirror.

At least one adjustable desired position of the mirror glass carrier with respect to both axes is recallably stored in a register. The new setting of the rear view mirror for the driver is contained in the recalling of the stored desired position, and may be accomplished, for example, through simple control button pressure. The rear view mirror can then be returned either by the driver to the recalled and indicated desired position or automatically to the recalled desired position. Through the thus possible reproducible return control of the rear view mirror to the stored desired position, the driver is essentially relieved and the safety of travel increased.

The desired position can be stored preferably electronically or mechanically, in a particularly simple manner, through the setting of the control element. For the automatic return control of the rear view mirror into the stored and recalled desired position, preferrably two position sensors be provided and are operatively coupled to the mirror glass carrier at two different sensing points angularly displaced with respect to the intersection of the axes, the position signals of which are compared in a comparator means with the stored desired position for the formation of position signals for the position motors. Potentiometers are preferable as position sensors, in which are generated the position signals at taps coupled to the mirror glass carrier.

The invention will be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a rear view mirror constituting a preferred embodiment of the invention in the travel direction of a vehicle after removal of a mirror glass and mirror glass carrier,

Figure 2 is a view of a section through the rear view mirror shown in Fig. 1 with the mirror glass and mirror glass carrier along the line II—II; and

Figure 3 is a circuit diagram for the electrical drive of position motors of the rear view mirror of Fig. 1.

The rear view mirror is closed in the direction of travel and is accommodated in a rearwardly open housing 1. The mirror is hinged on the vehicle about a substantially vertical axis 2.1 in accordance with standards through a link 2 fastened on the vehicle (not shown). On the inner surface 1.1 of the housing body a large mounting plate 4 is fastened and is anchored on the link 2 and carries the mirror glass carrier 7 with the mirror glass 7.1 as well as the positioning motors 40.1 and 40.2 in the manner to be described. Electrical conductors 14.3 and 14.4 for two position sensors 14.1 and 14.2 as well as power supply conductors 40.3 and 40.4 for the two positioning m motors 40.1 and 40.2 situated in the interior of a cup 4.1 mounted on the mounting plate 4 are led through the link 2 to the interior of the vehicle. The cup 4.1, round in cross-section, possesses, in the middle of its base 4.2 fastened on the mounting plate 4, a raised support 4.3. The positioning motors 40.1 and 40.2 rest on the base 4.2 on either side of the support 4.3 with their connection terminals electrically connected to the ends of the associated power supply conductors 40.3 and 40.4.

The support 4.3 has upstanding projections, one of which is shown in Fig. 2 as projection 4.5. From each of the projections is formed an outwardly extending nose 4.6 shown in dashed lines in Fig. 2.

A bar 5.4 spanning a diameter of the cup 4.1 is provided with two medial wings 5.5 (only one shown in Fig. 2) formed out of its lower surface and having an arcuate slot 5.6. The wings 5.5 abut laterally the projections 4.5 such that the noses 4.6 thereof are confined within the slots 5.6 in a manner that allows tilting of the bear 5.4 about an axis which is perpendicular the plane of Fig. 2. The length of each of the slots 5.6 is determined by the desired range of adjustment of the mirror glass

7.1 about said axis.

The oppositely lying ends of the bar 5.4 are modelled to axially extending shaft stubs 5.1, 5.3, each of which is accommodated in bushings 6.3, 6.4 on the inner rim of a cage 6 and is rotatable about a common pivot axis 8. The cage 6, round in cross section and having a circular skirt 6.5 extending into the open cup 4.1, is in this manner pivotable relative to the cup 4.1, and thus relative to mounting plate 4, about the two pivot axes 8, 9 crossing at right angles. The mirror glass carrier 7 supporting the mirror glass 7.1 on its outer surface is fixed non-rotatably in a not-shown manner on the cage 6.

On the inner rim of the cage 6, are formed two inwardly projecting links 6.1 and 6.2 displaced at approximately right angles on either side of the pivot axis 8 with respect to its crossing with the pivot axis 9. Into each of the links 6.1, 6.2 an end of a gear rack is accommodated the gear rack 40.3 being shown in Fig. 2 (the end of the bar 5.4 is broken away for the sake of clarity). A pinion of the drive shaft of the associated positioning motor 40.1 and 40.2 mates with the teeth of the related gear rack. Fig. 2 demonstrates gear rack-pinion drive assembly 42.2 associated to the link 6.2 and the positioning motor 40.2 having a drive shaft 41.2. Not shown are means holding the gear rack and the pinion in mutual engagement. Inwardly projecting lugs 6.6 and 6.7 are formed on the inner rim of the cage 6. The lug 6.6 is adjacent the axis 8 and the lug 6.7 is arranged adjacent the axis 9. The lugs are each coupled with a slider of a potentiometer 14.1, 14.2 acting as a position sensor. The taps 15.1, 15.2 (Fig. 3) of the potentiometers 14.1, 14.2 are electrically connected through the associated electrical conductors 14.3 and 14.4 to the inputs 16.1 and 16.2 of comparators 30.1 and 30.2, respectively. The potentiometers 14.1 and 14.2 are firmly connected to the cup 4.1 and the mounting plate 4. Thus, pivoting the mirror glass carrier 7 about one or the other of the pivot axes 8 and 9 alters simultaneously the position of the slider of the taps 15.1, 15.2 and thus the effective electrical resistance of the potentiometer 14.1, 14.2 for a current flowing through the taps and input circuits 16.1, 16.2 respectively.

As shown in Fig. 3 a power supply circuit 70.1 is provided for the positioning motor 40.1 and a power supply circuit 70.2 is provided for the positioning motor 40.2, whereby both power supply circuits are similarly wired. From a reference voltage applied to conductors 18.1 and 18.2 relative to terminal 35 and thus applied to the potentiometers 14.1 and 14.2, there is obtained, on tap 15.1 and 15.2, according to the position of each slider, a position signal corresponding to the actual attitude of the mirror glass carrier 7. The signal is supplied to the input 16.1, 16.2 of each comparator 30.1, 30.2 that forms the comparison means. Additional potentiometers 10.1, 10.2 forming the reference element, as well as additional, parallel connected potenitometers 12.1, 12.2 serving, if necessary, as further reference elements provide reference voltages to second inputs 16.3, 16.4, of the two comparators 30.1, 30.2. When closing the mechanically coupled switches 10.3, 10.4 and 10.5, 10.6, respectively, a reference signal representing the desired position of the mirror carrier 7 is fed to the comparators 30.1, 30.2, respectively. A desired reference position of the mirror glass carrier 7 with respect to the pivot axes 8 and 9 is stored by the actual positions of the slides of the potentiometers 10.1 and 10.2 and is recallable in the form of reference signals by closing of the switches 10.3 and 10.4 for comparison with the actual position of the carrier 7 as represented by the signals on input circuits 16.1, 16.2, respectively. The desired position of the rear view mirror for the first driver thus can be stored in the memory r represented by the potentiometers 10.1 and 10.2 by manual adjustment of the sliders of these potentiometers. A second driver, for whom a different position of the mirror glass carrier 7 is necessary, can store this position in the second memory represented by the potentiometers 12.1 and 12.2 by manually adjusting the sliders of these potentiometers.

As the driving circuits 70.1, 70.2 for the two positioning motors 40.1 and 40.2 that are controlled from the output signals of the comparators 30.1 and 30.2 are electrically similar, only the driving circuit 70.1 for the positioning motor 40.1 is described. The comparator 30.1 produces, at two output conductors 31 and 32, two output signals inverted relative to each other, the polarity of which depends on the positioning signal developed as a result of the comparison. A positioning signal of one specified polarity on the conductor 31 switches on, for example the electrical switch i.e. the transistor Tr 3, and the inverted positioning signal in the conductor 32 switches on the transistor Tr 2, while transistors Tr 1 and Tr 4 are cut off. Thus, a current path is created through the positioning motor 40.1 between the connection terminals 34 and 35 of the power supply circuit 70.1 connected with the vehicle battery and through the transistors Tr 2 and Tr 3. A positioning signal of reverse polarity on conductor 31 switches on the transistor Tr 1, and the correspondingly inverted positioning signal on conductor 32 switches on the transistor Tr 4, while transistors Tr 3 and Tr 2 are cut off. A current path for current flow in the reverse direction through the positioning motor 40.1 is thus created.

The generation of a positioning signal through the comparator 30.1 is ended as soon as the position signal picked up from the potentiometer 14.1 equals within a preselected tolerance range the reference signal recalled from the potentiometer 10.1 or 12.1. The tolerance range is adjustable through an adjustment circuit including a further adjustable potentiometer 19.1, from which is supplied a portion of the reference voltage corresponding to the position of its tap to a control input 33 of the comparator.

The power supply circuits 70.1 and 70.2 can be

mounted as fully integrated circuits on a chip in the interior of the vehicle. The connection of these chips to the conductors shown in Fig. 1 are not shown in Fig. 3 but can be realized without difficulty from the circuit diagram. The switches 10.3, 10.4, as well as the, if necessary, further switches 10.5, 10.6 can be mounted on the instrument panel so as to be accessible to the driver as can the adjustment tap on the potentiometers 10.1, 10.2, as well as 12.1 and 12.2 as well as the, if necessary, hysteresis potentiometers 19.1 and 19.2.

Various modifications may be made within the scope of the invention. For instance, the mechanical coupling of the switches 10.3 and 10.4 on the instrument panel may be effected by a single, not disclosed, switch. With the beginning of the trip the driver then needs to press only the switch that recalls the correct position for his personal sitting accommodation out of the memory, represented by four potentiometers 10.1, 10.2, 12.1, and 12.2, shown in Fig. 3. The two comparators 30.1 and 30.2 then produce the necessary positioning signals on their output conductors 31 and 32 until, in each case, the mirror has been returned through the position motors to the desired position. A corresponding adjustment of the tolerance range thus permits an automatic reproducibility of the rear view mirror position to a very small angular degree.

It is also possible to measure electrically, optically, or mechanically the actual position in the condition of the two racks betwee the links 6.1 and 6.2 and the drive pinions of the positioning motors 40.1 and 40.2 or at other points on the positioning motor instead of at the cup by means of the potentiometers 14.1 and 14.2.

CLAIMS

1. A rear view mirror for a vehicle, comprising a mirror glass carrier fastened on a mounting plate and pivotable with respect to the mounting plate about two independent axes, the carrier being coupled to drive shafts of electrically driven positioning motors at two pivot points angularly displaced with respect to each other about the intersection of the axes, there being provided a power supply circuit for each of the two positioning motors including a circuit for the desired operation of the associated positioning motor, the desired operation circuit including a memory for recallably storing at least one adjustable desired position of the mirror glass carrier with respect to the two axes.

2. A mirror as claimed in claim 1, in which the or each desired position is mechanically stored through setting of a or a respective control element.

3. A mirror as claimed in claim 1 or 2, in which two position sensors are coupled to the mirror glass carrier at two independent sensing points which are angularly displaced with respect to each other about the intersection of the axes, there being provided comparison means for comparing position signals from the sensors with the stored desired position for the formation of positioning signals for the positioning motors.

4. A mirror as claimed in claim 3, in which the position sensors are potentiometers, the sliders of which are coupled to the mirror glass carrier and the taps of which generate the position signals.

5. A mirror as claimed in claim 4, in which each of the potentiometers is connected in a first input circuit of the comparison means, which has a second input current arranged to receive the desired values stored by the setting of the control means.

6. A mirror as claimed in any one of claims 2 to 5, in which the memory comprises, for each stored desired position, two potentiometers in each of which is stored a desired position of the carrier with respect to a respective one of the axes.

7. A mirror as claimed in any one of claims 3 to 6, in which the tolerance range of equality between the actual position of the mirror glass carrier represented by the positioning signals and the recalled desired position is adjustable by an adjustment means for controlling the comparison means.

8. A mirror as claimed in any one of the preceding claims, in which the mirror glass carrier is detachably fastened on a cage which is pivotably fastened to a mounting plate, so as to be tiltable about two perpendicular axes.

9. A mirror as claimed in claim 8, in which the two positioning motors are fastened on the interior of the cage on the mounting plate, the drive shaft of each of the positioning motors being coupled through a respective worm drive to a respective link fastened on the cage.

10. A mirror as claimed in claim 8, or 9 when dependent on claim 3, in which the cage is coupled to the position sensors by respective lugs, each of which is adjacent a respective one of the axes.

11. A mirror as claimed in any one of the preceding claims, in which the comparison means comprises two comparison chips mounted with one or more parallel connected control means in the interior of the vehicle and electrically connected to the power supply of the vehicle and to the positioning motors and positioning sensors on the mirror.

12. A rear view mirror substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

13. A rear view mirror comprising a movable mirror carrier, positioning motors for moving the mirror carrier and a control circuit for controlling the motors, the control circuit including memory means for permitting the carrier to be moved to a desired stored position.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.